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# Proposing Goal Refinement for Multi-Agent with Agent UML Tool for the Control of Explosive Terror Threats

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# Introduction

- ☐ Aim of Approach
- ☐ Agents and Multi-agent
- ☐ Terrorism and its Types
- ☐ Terror Scenario & Agent based analysis
- ☐ Agent UML Tool
- ☐ Future work



# Aim of Approach

- This presentation is not to create fear of terror
- Identify types of terrorism
- Identify computational capability that can identify **chemical** means of terror attacks and prevention
- To analyse a multi-agent approach to Chemical weapon detection using Agent UML tool.



# Terrorism and Types

## Terrorism

### The purpose of terrorism:

- To instil or create fear.
- To intimidate people or organisations or government to do what ordinarily they would not do.

### Definition

- Terrorism is the illegitimate or extranormal use of violence against non-combatants to achieve political ends (Gerwehr & Hubbard, 2006; Laqueur, 1987).
- In Gerwehr & Hubbard (2006) terrorism form of social influence that employs the acts of violence (instead of leaflets or loudspeakers, for example) to influence a target population's emotions, motives, objective reasoning, perceptions, and ultimately their behaviour.
- Terrorism is the deliberate use of violence, or threat of its use, against innocent people, with the aim of intimidating them, or other people, into a course of action they otherwise would not take (Primoratz, 1990). The act of terrorism instils fear.



# Terrorism & its Types

## Types of Terrorism

- **Individual terrorism:**

This is a lone individual sponsored terror attacks against group of people or other individuals.

- **Sect terrorism:**

A group (religious or ethnic) sponsored terror against individuals, groups or a nation.

- **State terrorism:**

This is a state or nation sponsored terrorism against another nation.





# Terror Scenario & Agent based analysis

Examples of the aftermath of terror attack





# Agents and Agent UML

An **agent** is a ***autonomous*** computer system (software or hardware) that is situated in an environment and can observe and act in that environment according to design objectives (Woodridge, 2009).

A **multi-agent** is a group of agent that socialise and work together to realise the overall common goal of a system.

## Agent UML or AOSE

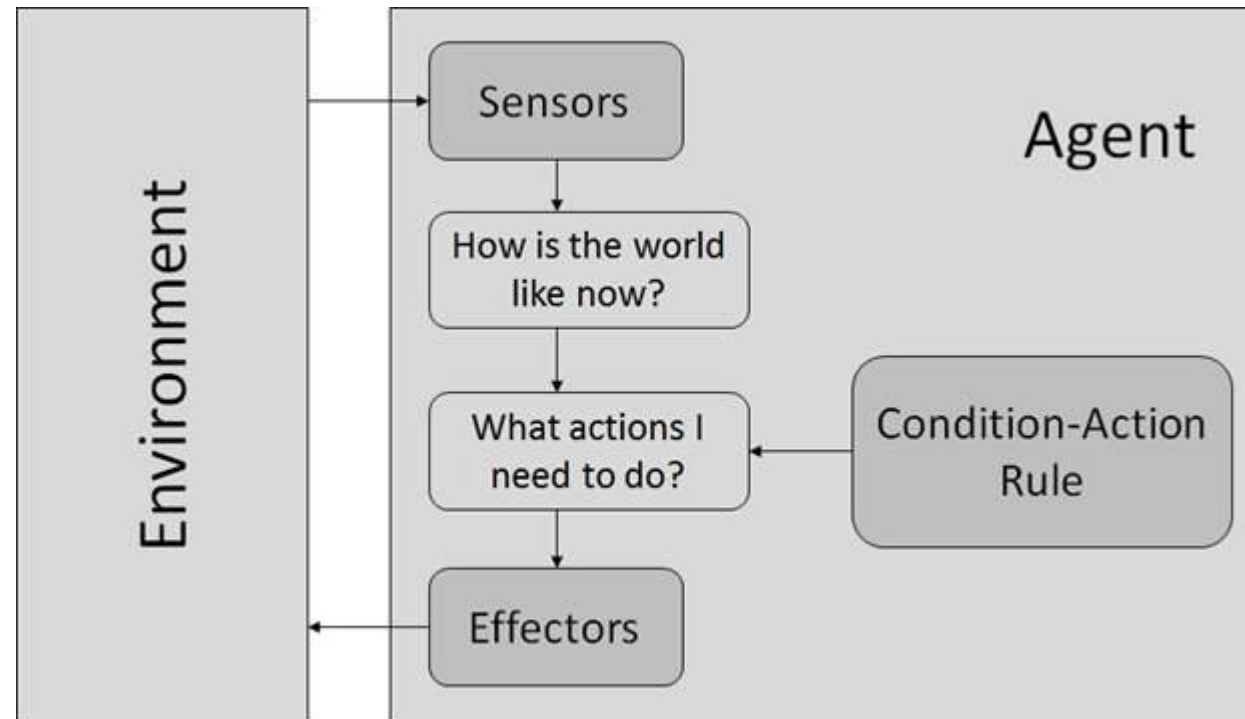
- a design support notation tool for agent- oriented systems development.
- used for representing agents, their behaviour and interaction





# Agent Design Model

## Example of an Agent Design Model



Simple Reflex Agent Model (Russell & Norvig, 2010)



# Agent UML Methodologies & Tools

## Agent Methodologies

- Agent software engineering process e.g.
  - **Gaia** (Wooldridge *et al.* 2000),
  - **Tropos** (Bresciani *et al.* 2004),
  - **PASSI** (Cossentino, 2005; Cossentino, & Potts, 2002),
  - **MaSE** (DeLoach *et al.* 2001), Prometheus.

## Tools

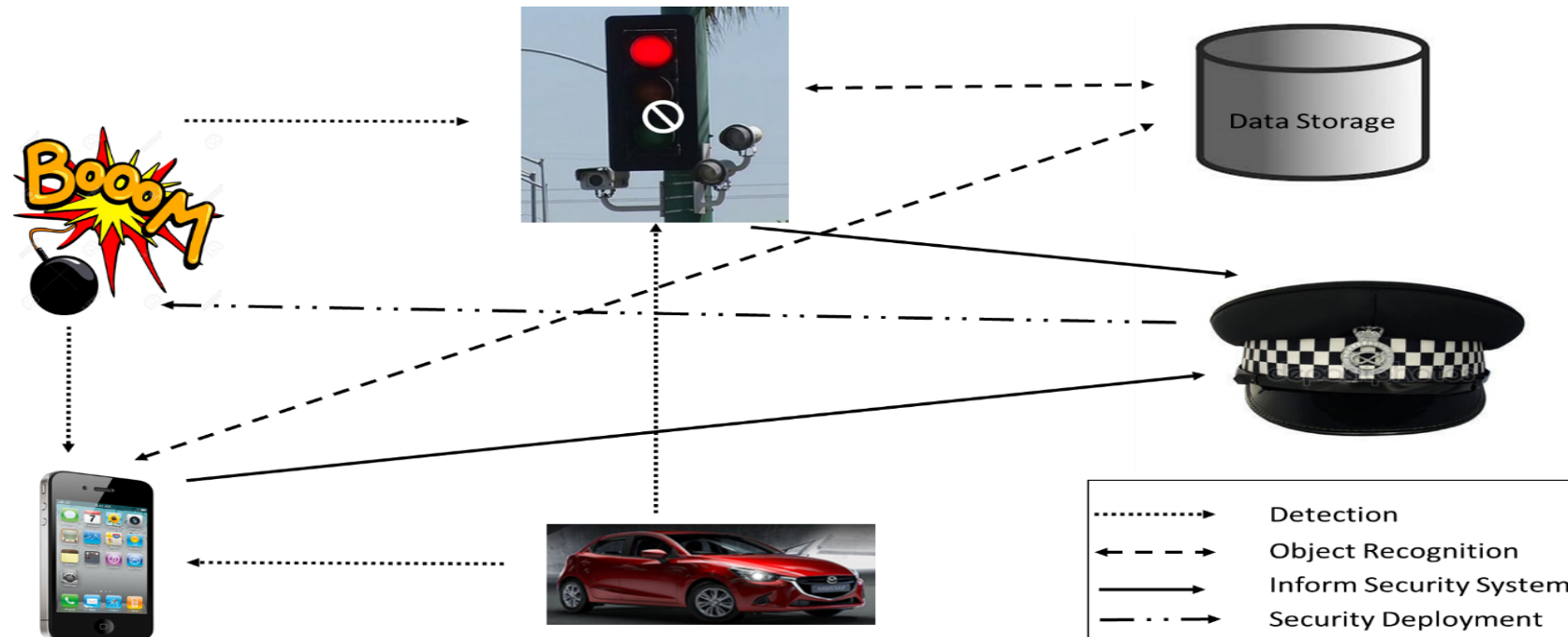
Are graphical editor for specifying the design process of intelligent agents, e.g.

- Gaia e.g. **Gaia4E** (Cernuzzi & Zambonelli, 2009)
- Tropos e.g. **Taom4E** (Morandini *et al.* 2011)
- Prometheus: **PDT**, called the Prometheus design tool
- This design analysis is based on the PDT



# Terror Scenario & Agent based analysis

A scenario for intelligence analysis and detection





# Terror Scenario & Agent based analysis

The PDT (Prometheus Design Tool) for analysing the detection of chemical explosives

Having known the problem scenario, we can

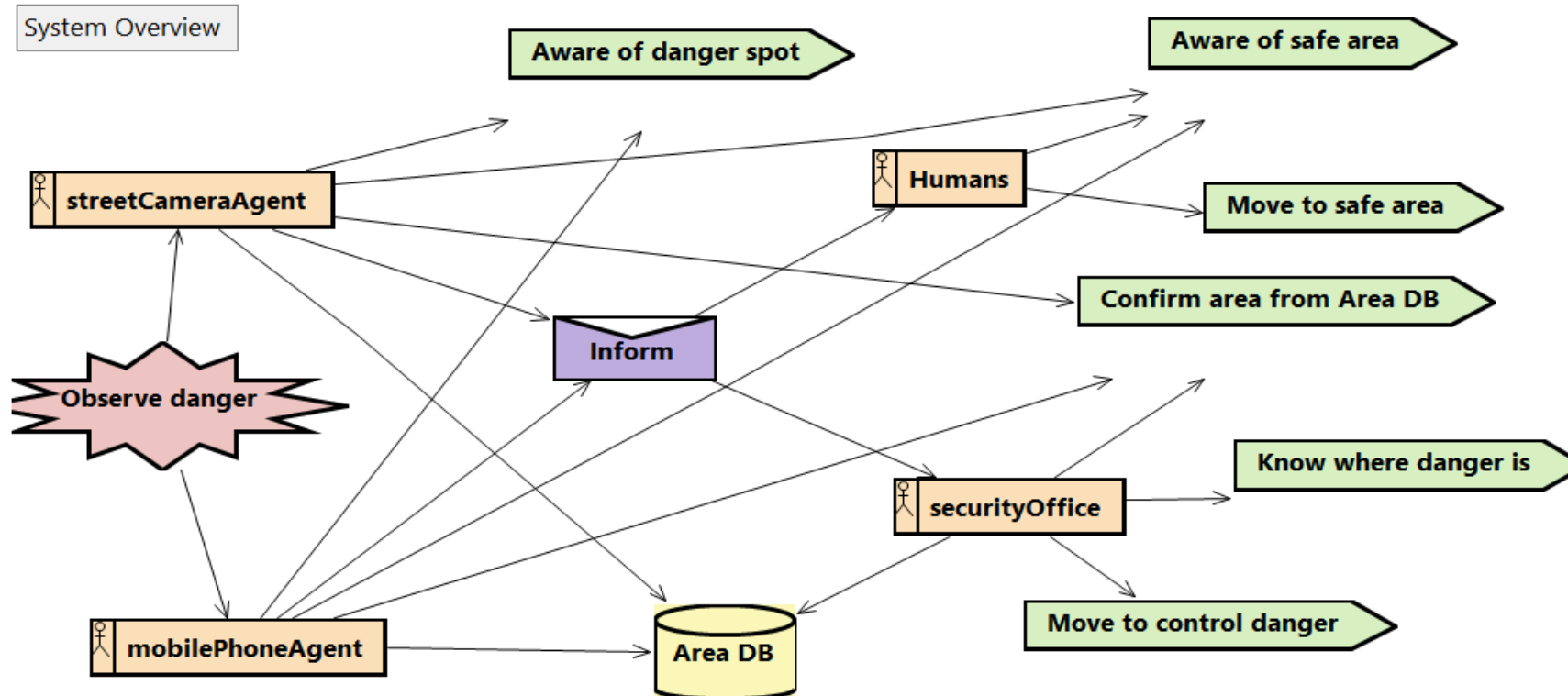
- Identify the number of agents
- Identify actors i.e. humans
- Assign functions and roles to agents and actors, respectively
- Identify data & substance repositories for intelligent learning
- Determine interaction protocol and messages between the various entities i.e. agents, humans, repositories, devices
- Build the phases of design





# Terror Scenario & Agent based analysis

## Architectural Design Phase: System overview diagram

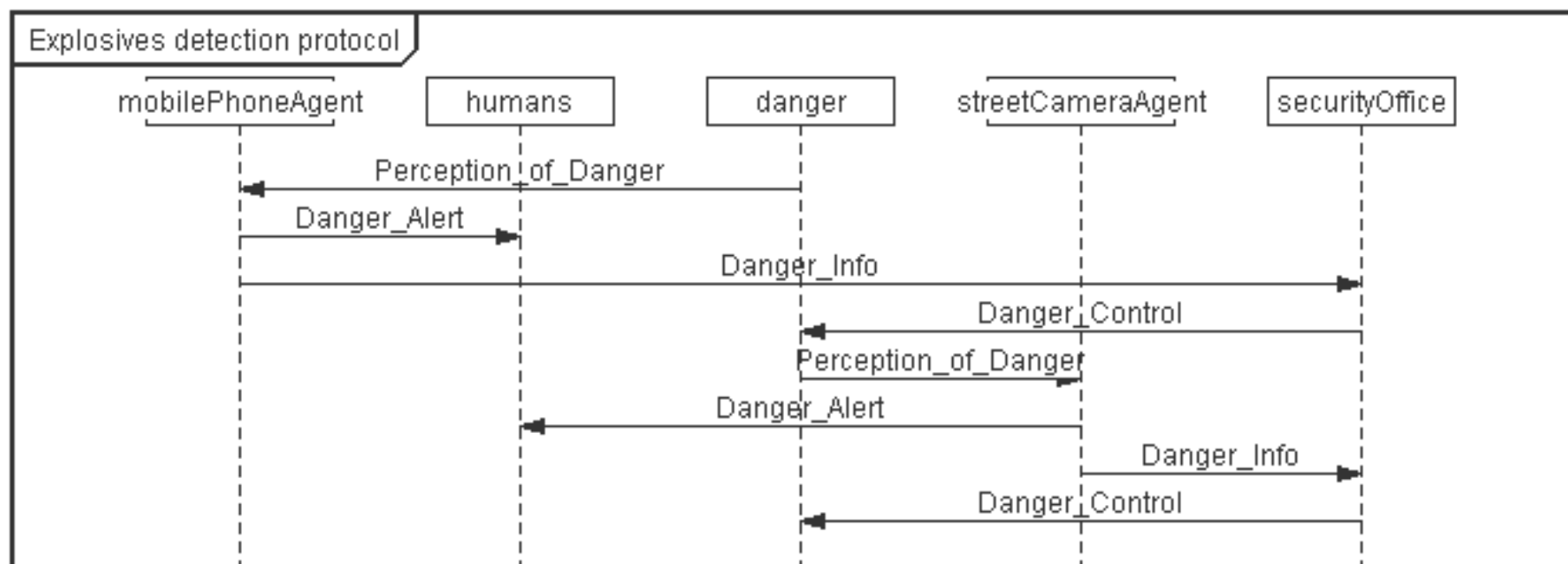




# Terror Scenario & Agent based analysis

## AUML interaction protocol

- This the sequential interaction between the entities in the design using the AUML command.
- The Figure below is a protocol analysis of detection, alert and rescue process







# Challenges and Solution to Intelligent Approach in Developing Nations

## Future Challenges

- ❑ **Energy supply:** There could be lack of adequate energy sources to power devices where intelligent agents are situated.
- ❑ **Funding:** Developing nations may not be willing to spend money on the technology.
- ❑ **Expertise:** Indigenous expertise to implement such technologies.
- ❑ **Implementation platform:**  
Jack™, Cougaar
- ❑ **Solution**  
Knowledge and research collaborative between the developed and developing nations. This where the United Nations becomes relevant. Like the **Dr John Quinn United Nations Global Pulse** in East Africa.



# Future work

## **Simulation:**

Simulate the process for testing

## **Implementation:**

Real world implementation

*The End*



# Questions

**Thanks for listening**

**Question and answer please**